

U.S. Patent Application Serial No. **10/058,103**
Amendment dated March 23, 2004
Reply to OA of **December 23, 2003**

REMARKS

Claims 1 to 8 are in the application wherein claims 1 to 5 and 7 are rejected under 35 U.S.C. §102(b) as anticipated by the patent to Krevor or, alternatively, under 35 U.S.C. §103(a) as being obvious over this patent. The indication by the Examiner that claim 6 of the application contains allowable subject matter is acknowledged.

The Office Action has been considered and pursuant thereto the claims in the application have been amended in order to more clearly define Applicants' invention and to better distinguish it over the Krevor patent.

The claimed invention, particularly as recited in the claims as amended, relates to a vibration absorbing rubber hose for the conduct of mediums therethrough in which the hose comprises at least one rubber layer composed of a rubber composition having a storage elastic modulus (E') of 20 to 100 MPa at 200 Hz with a elongation strain of 0.1% at an ordinary temperature, and a damping factor ($\tan \delta$) of not smaller than 0.4.

The vibration absorbing rubber hose of the invention, as described in page 9, lines 1 to 7 of the present specification, can advantageously be used as a hose having utility in an air-conditioner. In addition, the inventive hose can be used as an automotive fuel hose, an air hose, as well as hoses for an engine-cooling system (i.e., with a radiator or a heater), a power steering system, an automatic transmission system or a braking system. As stated above and as described in the specification, the inventive hose is intended to pass mediums, such as, for example, refrigerants, automotive fuels, cooling water or oils.

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Hoses for the conduct of mediums therethrough are conventionally required to have a sufficient barrier property with respect to the mediums flowing therein, so that resins excellent in barrier properties are normally used as materials for the hoses. However, resin hoses generally have a high rigidity and disadvantageously cause noises due to vibrations thereof. Further, resin hoses are less pliable and, hence, inferior in mounting stability. On the other hand, rubber hoses, which are generally more flexible and pliable, are unsatisfactory in vibration absorbing properties and shape retaining properties, as noted on page 1 of the present specification.

In the course of conducting intensive studies in search of a solution to these problems, the inventors found that a vibration absorbing rubber hose which is excellent in vibration absorbing properties, mounting stability and shape retaining properties, can be obtained by employing for formation of at least one rubber layer of the hose a specific rubber composition having a storage elastic modulus (E') and a damping factor ($\tan \delta$) that reside within predetermined ranges. These particular characteristics are embodied in all of the claims as now amended in the application. Consequently, the claimed invention is to be contrasted with the device of the Krevor patent in that the latter only discloses a tubing device which is intended for use as a housing for an electronic device, or the like. The Krevor device is clearly not a device for passing mediums, such as refrigerants, automotive fuels, cooling water or oils, or the like, as is the claimed hose construction. This is because the Krevor tubing device does not have a sufficient barrier property with respect to the mediums contained therein, so that the device cannot be used as a hose in which the mediums flow, for example, a hose for an air-conditioner, an automotive fuel hose, an air hose, as well as

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hoses for an engine-cooling system (a radiator and a heater), a power steering system, an automatic transmission system and a braking system.

On the other hand, the vibration absorbing rubber hose of the present invention, as stated above, can be used as a hose for an air-conditioner, an automotive fuel hose, an air hose, as well as hoses for an engine-cooling system (a radiator and a heater), a power steering system, an automatic transmission system and a braking system because the inventive hose is well able to pass flowing mediums, such as refrigerants, automotive fuels, cooling water or oils, or the like.

Thus, it is plainly evident that, as described above, the inventive vibration absorbing rubber hose is completely different in its construction, its object, and its application from the Krevor tubing device.

Additionally, another important difference between the Krevor device and the claimed invention is that the Krevor tubing device is restricted to a laminated article having three layers which are joined together. For example, the device having a three-layer structure formed by combining materials A to P in column 9 of the Krevor patent as described in examples 1 to 16. Among materials A to P, only material G is nitrile rubber and the others are all resins. Further, the Krevor device having a three-layer structure formed by using nitrile rubber materials G is described in Example 11 wherein the device is described as comprising an inner layer, an intermediate layer and an outer layer in which both of the inner layer and the outer layer are composed of high-density polyethylene of material E and only the intermediate layer is composed of nitrile rubber of material G. The device of Example 24 also comprises an inner layer, an intermediate layer and the outer layer

wherein both the inner layer and the outer layer are composed of low density polyethylene and only the intermediate layer is composed of EPDM. Thus, it can be clearly seen that, the Krevor device, having a three-layer structure, is substantially a resin device wherein all three layers are composed of resins. The Krevor patent describes that an intermediate rubber layer may only exceptionally be formed between an inner resin layer and an outer resin layer. Therefore, there is no teaching or suggestion in the Krevor patent that all structural layers are composed of rubber as disclosed for the present invention. Such resin devices, as disclosed by Krevor, and as stated above, have a high rigidity, and disadvantageously cause noises due to vibrations thereof. Further, resin hoses like that of Krevor are less pliable and, hence, inferior in mounting stability when compared with rubber hoses.

Accordingly, as contrasted with Krevor, the claimed vibration absorbing hose is a rubber hose which comprises an inner rubber layer 1, an intermediate rubber layer 3 and an outer rubber layer 5 as shown in Fig. 1. In other words, the inventive hose is a rubber hose in which the intermediate layer, as well as both of the inner layer and the outer layer are composed of rubber. Therefore, the inventive hose is completely different in its structure from the Krevor resin device.

In addition, and importantly, the inventive hose is not limited to a hose having only a three-layer structure, but, instead, may be only a single layer structure comprising a single rubber layer, or it may be a double layer structure comprising an inner rubber layer and an outer rubber layer as described in the Examples.

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Stated another way, if the inventive hose has a single layer structure, the single rubber layer is composed of the specific claimed rubber composition. If the inventive hose has a multiple layer structure, at least one rubber layer is composed of the specific claimed rubber composition. Contrariwise, the Krevor patent does not teach or suggest any of the foregoing characteristic structures and the specific advantageous effects of the present invention.

Furthermore, while the present invention contemplates that butyl rubbers and halogenated butyl rubbers are preferred as the rubber components of the specific rubber composition, the Krevor patent does not teach or suggest about the use of such butyl rubbers. Still further, although the Krevor patent teaches a reinforcing layer 24 in Fig. 4, it does not specifically teach a rubber hose as described in Fig. 1 of the present invention. That is, in the present invention as described, the reinforcing filaments contrary to the Krevor construction are spirally wound around the inner rubber layer 1 so as to form a reinforcing layer 2 between the inner rubber layer 1 and the intermediate rubber layer 3, and the reinforcing filaments are spirally wound around the intermediate rubber layer 3 so as to form a reinforcing layer 4 between the intermediate rubber layer 3 and the outer rubber layer 5.

For the foregoing reasons it is submitted that the device of the Krevor patent neither anticipates applicants' invention in accordance with 35 U.S.C. §102(b) nor renders it obvious in accordance with 35 U.S.C. §103(a), and that the claims, as now amended in the application, all patentably distinguish over the device described in the Krevor patent. The claims therefore are submitted as being patentable over the reference and should be allowed. The Examiner is accordingly, requested to favorably consider this Amendment and to allow the application.

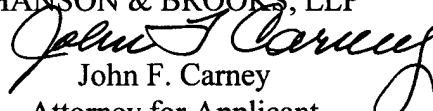
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If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicants undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

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